

**PILOT LGPP
TECHNOLOGY PARK WORKSHOP**

**GLIWICE, POLAND
JULY 10, 1997**

Prepared for

East European Regional Housing Sector Assistance Project
Project 180-0034
U.S. Agency for International Development, ENI/EEUD/UDH
Contract No. EPE-C-00-95-001100-00, RFS No. 613



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July 1997
UI Project 06610-613

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BACKGROUND

A Technology Park Workshop was held on July 10, 1997 in Gliwice, Poland. The workshop was funded by the U.S. Agency for International Development as part of the Pilot Local Government Partnership Program (LGPP) being implemented by the Urban Institute Consortium. Gliwice is one of the eight partner cities in Poland's pilot LGPP and has requested assistance in assessing the viability of developing a Technology Park.

As part of their economic development strategy, the municipality is researching the possibility of developing a technology park. This workshop was designed to provide participants with a clearer understanding of the technology park concept so that they could make an informed decision about whether and how to proceed.

The workshop resulted in the development of a consensus that Gliwice should proceed with a technology park project, identification of the Gliwice Economic Development Agency as the lead organization, and an understanding that the project would proceed in three stages. The first stage is the technology incubator, which will open officially in September; the second stage is a technology transfer center linked to the incubator; and the third stage is a technology park.

WORKSHOP OBJECTIVES

The workshop was intended to accomplish the following tasks:

- Provide an overview of what technology parks are in the American context and in the Polish context to bring workshop participants to a common level of familiarity with key concepts.
- Encourage participants to identify the resources that Gliwice has to contribute to development of a technology park and the resources that are not in place but are needed.
- Decide on the next steps for the development of the Technology Park.

WORKSHOP PARTICIPANTS

The one day workshop was attended by 21 participants and three observers plus the staff of four consultants (see Appendix A, List of Participants). The participants included representatives of the executive committee of the Gliwice City Hall, the municipality of Zabrze, the Foundation for the Development of the City of Knurów, regional development agencies for the Katowice Province, the Silesian Technical University and three of the research institutes in the Region.

WORKSHOP AGENDA

The Technology Park Workshop was designed by Pat Dusenbury, Urban Institute consultant, and Hanna Ruszczyk, Deputy Director of Citizens Democracy Corps Poland. It was facilitated by Krzysztof Chmura. Maciej Gajewski provided information about the Polish experience in technology park projects.

Prior to the workshop, Ms. Dusenbury and Ms. Ruszczyk interviewed 15 of the invited participants about their expectations for the workshop. The interviews revealed an extremely broad range in the participants' knowledge of technology parks. Some had visited parks in the United States; others had no understanding of the concept. Interviews also identified several major topics the participants wanted to have addressed during the workshop, including:

- General information about Technology Parks; definitions and goals; and organizational structure (How will it be organized? In what ways can we cooperate together?)
- Experiences in other countries
- Financing
- Copyright laws as they relate to intellectual property

The workshop agenda (Appendix B) was designed to respond to concerns raised during the interviews.



WORKSHOP PERFORMANCE

After a welcome by the Mayor of Gliwice, the facilitator began the working session by establishing the following guidelines for working together:

- Actively participate
- Keep comments short and focused
- Value the opinions of others
- Keep politics out of the discussion
- Create and maintain a friendly and constructive atmosphere

The pilot LGPP staff presented information about definitions, the American experience with technology parks, the Polish experience with technology parks, and lessons learned from experiences in both countries.

Then, participants were divided into three groups for the working sessions. During the first working session, their task was to identify existing local resources supporting the development of a technology park. The results are shown in the following chart.

Resources Available to Support a Gliwice Technology Park

Group 1	Group 2	Group 3
<ul style="list-style-type: none">• Production companies<ul style="list-style-type: none">- Elzab- JTT Silesia- Termoizolacja- Temed- Linodurt- Meraster• Silesian Technical University• Medical Academy• Academic Research Institute• Design Offices• Academic Research Associations, Professional (Economic, Legal)• Business Support Institutions• Financial Institutions• Real Estate - Land, Buildings• Special Economic Zone• Technical Infrastructure• Human Resources• Climate	<ul style="list-style-type: none">• Incubator Buildings• Silesian Technical University - academics• Institutions• Special Economic Zone• Duty Free Zone• Location - good communication (good transportation links)• Qualified work force• Good atmosphere in the city• Good example for investment• "City of Success"• Attractive environment for relaxation• Part of an agglomeration• Access to services• Access to public owned land• Close proximity to the Czech Republic and Slovakia• Computer Network in the city• Workforce and consumers is around 7 million people	<ul style="list-style-type: none">• Potential for academic-research<ul style="list-style-type: none">- Silesian Technical University- Academic-Research Institutes- Technical education• Location of the city• Communications Network (roads, harbor, access, airport, rail)• Special Economic Zone (potential suppliers / receipts of technology and services)• Support Institutions: GAIG, GAPP, GARiP, RIP-H,...• Euro-Business Park (GAPP experience)• Atmosphere of Cooperation: Municipality, Silesian Technical University, Companies and Institutes

During the second working session, the task was to identify the resources that were needed to support the development of a technology park. The results are shown in the following chart.

Resources Needed to Support a Gliwice Technology Park

Group 1	Group 2	Group 3
<ul style="list-style-type: none"> • Money <ul style="list-style-type: none"> - Seed capital for start up and development - Working Capital • Innovation Transfer Center • Technology Incubator • Information (market) • Clear Legal Status of Property • Qualified Management Material • Economic Incentives 	<ul style="list-style-type: none"> • Finances <ul style="list-style-type: none"> - Financial Assistance Fund (internal and external) - Legislation - Sponsor • Marketing of the Park (expectations and possibilities) <ul style="list-style-type: none"> - Market analysis - Promotion • Institutionalizing the Project 	<ul style="list-style-type: none"> • Markets for the products of the Park • Financial sources for the formation and operation of the Park • Common vision / conception • Defining the location • Feasibility Study / Business Plan • Business Support Environment

NEXT STEPS

A presentation by pilot LGPP staff about available financial resources was followed by the third working session, in which the group as a whole discussed the viability of a technology park project in Gliwice and came to a consensus that work on the project should proceed, and that the Gliwice Economic Development Agency is the lead agency. The lead individual is Wojciech Napierala. The participants agreed that this was a three stage process that has begun with the technology incubator, will proceed to development of a technology transfer center, and then lead to the development of a technology park in Gliwice.

The participants described their visions for the technology park project, in two years and in ten years. The vision for two years in the future (1999) is the following:

- Incubator full of High Tech companies
- Tech Transfer Center is working
- Feasibility Study completed
- More investors
- Better “condition” of Institutes
- Academic-Technology Information Center in the Silesian Technical University
- First decisions made about the future of the Park
- Educational programs have begun



The vision for ten years in the future (2007) is the following:

- Incubator is closer to the center of the city - Konarskiego St. is connected to Zabrska St.
- On the GZUT building site is a Virtual Park
- Chemistry/Biotechnology Focus

Based upon these visions for the future, the group developed a series of next steps that would move the project toward achievement of their vision. These steps are listed as follows:

NEXT STEPS: WHAT, WHO, and IN WHAT ORDER is to be done

- Formation of a task force, team
- Examples of parks - provided by the Pilot LGPP
- Analysis of financial sources
- Business plan for the Technology Incubator and the Technology Transfer Center/ Feasibility Study
- Who is interested in the Park - GAIG
- Technology Audit
- Market Analysis(complete - consumers, producers)
- Location Analysis, Master Plan
- Formation of the Technology Transfer Center
- Promotion

Finally, the participants identified information resources that can assist with topics that need to be understood more clearly before additional plans and decisions can be made. These include the following:

- Model and Feasibility Study
- Center and Technology Incubator (Park as Goal)
- Legislation
- Consultant Team

EVALUATION

After the workshop, participants were asked to complete an evaluation form. The evaluation results are compiled in Appendix C. It is clear that the participants want more information about technology parks to guide their decisions. The Gliwice Economic Development Agency (GAIG) has been given additional information, and more will be provided as needed. The handout package provided to participants also contains more specific information than was presented during the Workshop. GAIG has the materials for at least one additional workshop, and plans to move ahead on their own.

APPENDIX A

LIST OF PARTICIPANTS

No.	<i>Institution Represented, Name, and Position of Attendee</i>
1.	Upper Silesia Agency of the Development and Entrepreneurship, Katowice -Andrzej Gajaewski - Vice President
2.	Technical University of Silesia - Remigiusz Sosnowski - Director for Educational Issues
3.	Anna Skowrońska - Łuczyńska - Deputy of the Polish Sejm
4.	City Hall, Zabrze - B. Grzegorzak - Manager of the Team on Promotional Activities
5.	Institute of Fire-proof Materials - Gliwice - Józef Wojsa- Director
6.	Institute of Medical Technology and Equipment - Sławomir Latos - Secretary for scientific issues
7.	Institute of Medical Technology and Equipment - Adam Gacek - Director
8.	Technical University of Silesia - Jerzy Barglik - Rector's Plenipotentiary on Technological Transfers
9.	City Council, Gliwice - Piotr Wieczorek - Member
10.	City Council, Gliwice - Zygmunt Frankiewicz - President
11.	City Council, Gliwice - Andrzej Jarczewski - Vice President
12.	City Hall, Gliwice - Krzysztof Korybalski - Official of the APM
13.	Foundation of the Area of Upper Silesia - Design Studio, Katowice - Andrzej Grzybowski - President
14.	City Hall, Gliwice - Piotr Popiel - Assistant to the President
15.	Institute of Non-ferrous Materials - Dr. Woch - Secretary for scientific issues
16.	The City of Knurów Development Foundation - Ewa Drzyzga - President
17.	Upper Silesia Agency of Entrepreneurship - Andrzej Podsiadło - President of the Board
18.	Upper Silesia Agency of Entrepreneurship - Joanna Machnik - Słomka - Assistant to the President of the Board
19.	Uniconsult - Maciej Gajewski - Senior Specialist
20.	Local Governments Pilot Partnership Program - Krzysztof Chmura - Adviser
21.	CDC Management Consultants - Hanna Ruszczyk - Deputy Director
22.	Urban Institute - Pat Dusenbury - Consultant
23.	Upper Silesia Agency of Economic Initiatives - Włodzimierz Koczot - Director

No. Institution Represented, Name, and Position of Attendee

- 24. Upper Silesia Agency of Economic Initiatives - Wojciech Napierala - Deputy Director
- 25. City Council, Gliwice - Andrzej Karasiński - Vice President
- 26. Program Design & ... - Eric Chetwynd - Consultant
- 27. USAID - Jonathan Hoeh - Deputy Manager of the LGPP Program
- 28. Leszek Luchowski, PhD - interpreter

APPENDIX B

AGENDA

9:00	Welcome	Zygmunt Frankiewicz, Ph.D. President of Gliwice
9:10	Introduction to the Workshop: Purpose and Goals Introduction of Participants	Krzysztof Chmura
9:45	The American Experience	Pat Dusenbury
10:25	The Polish Experience	Maciej Gajewski
10:45	BREAK	
11:00	Lessons Learned: Factors for Success	Hanna Ruszczyk
11:20	Task I: Gliwice Resources in Place for a Technology Park	Group Exercise
11:50	Presentation: Gliwice Resources in Place for a Technology Park	Working Groups
12:20	LUNCH	
13:20	Recap of Morning Goals for Afternoon	Krzysztof Chmura
13:30	Task II: Resources Needed for a Technology Park in Gliwice	Group Exercise
14:00	Presentation: Resources Needed for a Technology Park in Gliwice	Working Groups
14:30	Where Help is Available: Technical and Financial Assistance	Pat Dusenbury Maciej Gajewski
14:50	BREAK	
15:05	Issues to Consider if You Decide to Move Ahead: Possible Next Steps	Hanna Ruszczyk
15:30	Task III: Moving Ahead? Yes or No If Yes, Next Steps	Group Exercise
16:15	Presentation: Moving Ahead? Yes or No. If Yes, Next Steps	Working Groups
16:45	Wrap-up and Evaluation	Krzysztof Chmura
17:00	Adjourn	

APPENDIX C

EVALUATION RESPONSES

What did you like about the Technology Park Workshop? What did you find most useful?

- People were able to exchange ideas freely - it was a good working atmosphere, logical - step by step presentations (good info. presented by Pat, Hanna & Maciej).
- There was good discussion.
- The whole workshop - I was eager to get people together and to hear their views.
- All of the workshop was needed.
- The most important part is this one which induced positive attitudes toward the idea.
- I liked the lecture (seminar) on park's concept and the U.S. case studies, showing the stages of technology park development.
- The presentation about available assistance funds.
- Group work.
- The final part of the workshop - the next steps that need to be done.
- Problems to be solved - next steps.
- I like the schedule (action plan) that resulted.

What, if anything, should we have done differently for this workshop?

- You should have presented more information about the U.S. experience.
- Examples should have provided more detailed information about economic and organizational structure.
- Present more examples - illustrated by pictures of existing technology parks.
- Present more examples, perhaps each working group should have developed its own park project.
- More examples of existing of parks in Poland and abroad should have been included in the introductory part.

- More precise definitions of CTT, Incubator, Tech. Park would have helped participants who were not knowledgeable about the topic.
- The introductory part was too broad, too general. (2)
- When talking about the future, the scenario planning method should be used.
- Present a summary after every stage of workshop.

Do you have any comments about the facilitator and outside resources?

- Krzysztof is great.
- The facilitator can participate in working groups.
- They did a good job. (2)
- Beyond reproach.
- Excellent work by facilitator and interpreter.
- They should have provided a more precise description of tasks the participants were asked to do. (2)

Do you have any comments about workshop facilities and logistics?

- A round table would have been better.
- It is better to have workshops out of the work place so that people can "escape."
- They were okay.
- Short main topics.
- Handout should be delivered before workshop - especially the definitions.
- Handouts should have been prepared in another way. (2)
- Nice place.

What areas of concern do you have about the technology park proposal? Do you have suggestions for future workshops?



- There is a lack of common understanding of park concept. More time is needed to develop a precise definition, and more examples are required.
- We need more precise information about how to build an Incubator in Gliwice.
- There were no clear financial and organizations rules for establishing a technology park.
- There is insufficient understanding of the concept by decision makers and insufficient interest from industry.
- There is no intent to make a real commitment.
- There was only a small commitment by stakeholders.
- More commitment from stakeholder side is required.
- There were no persuasive arguments about the results and benefits of a technology park.
- It was too early for a workshop, but the approved next steps schedule corrects this.
- I have no concerns, if the project proceeds as agreed upon at this workshop.
- The mutually agreed project of the park should be done.
- Even small but real steps should been done as soon as possible.
- Perhaps, someone could be brought over from the states who was directly responsible for establishing a technology park.
- Discuss the differences in the legal and economic environment in Poland and the USA.
- I'm afraid that the Polish political system will not support a technology park.

Do you have any other comments?

- Enlarge the stakeholder groups.
- Nice event, but the initial stages, e.g. the technology transfer center, should be explained before we spend time talking about the park. This is an unknown area.
- A working summary report should be sent to each participant.
- I hope for a better future for Polish research and industry.
- We need more meetings of this kind.
- Speed up the next workshop and make it shorter.

APPENDIX D

THE AMERICAN EXPERIENCE: FROM RESEARCH PARKS TO TECHNOLOGY INCUBATORS

From a Presentation by Pat Dusenbury
Gliwice Technology Park Workshop, July 10, 1997

INTRODUCTION

Why are we here to talk about establishing a technology park to promote economic expansion? The answer lies in the evolution of the world economy and the changes in economic development theory that reflect that evolution.

The classic factors supporting economic expansion were land, labor, and capital. These factors described the agricultural economy. As industrial economies evolved, the advantage lay with those locations that enjoyed an abundance of raw materials, labor, and capital. Thus Silesia developed great industries based upon its coal resources. Today, the developed countries are leading the world into the post-industrial era, where the advantage lies with those locations that have strong resources of knowledge and information as well as labor and capital.

This theory has practical applications. To quote from an article about economic expansion in the U.S. that has been translated into Polish and will be distributed to you later.

... leaders in education, industry, and government already perceive quite clearly that economic development and competitiveness increasingly depend on the degree to which *intellectual products* of basic research are moved into applied research and commercialization. The question is no longer *whether* but rather *how* best to do so.

Eva Klein in *Innovative Models for University Research*, Haden and Brink editors, p. 12.

Technology parks and incubators have become a favored way of achieving this movement. The first U.S. example, Stanford Research Park, was established in 1951. It was designed as a physical environment that would bring together Stanford University's research capacity with private sector business to create economic expansion. The results include the legendary Silicon Valley.

DEFINITIONS

Everyone has heard of Silicon Valley, but many of the terms used in discussions of the post industrial economy are less well known, and so I would like to begin this presentation of the American experience with technology parks by sharing a set of definitions with you. These definitions, as shown in Chart 1, are drawn from the U.S. experience. Later on today, you will be asked to develop your own definition for a technology park that would be meaningful for you, here in Upper Silesia.

Chart 1
Definitions

-
- **Public Private Partnership.** Government working with business, non-profits and/or educational institutions to promote their common interest. The partnership may involve any combination of governmental and non-governmental entities.
 - **Technology.** The method of production.
 - **High Technology.** A method of production using advanced scientific knowledge.
 - **Innovation.** A new way of doing something.
 - **Technology Transfer.** The sharing of information about scientific discoveries to bring about innovations in technology.
 - **Technology Transfer Center.** A platform for the exchange of information about scientific knowledge and needs between research and development organizations, such as universities, and potential industrial users of that knowledge in order to facilitate the development and commercialization of new products, services, or methods which, in turn, create new high technology businesses or renew older industries. (Adapted from Eva Klein in Haden and Brink, editors, *Innovative Models for University Research*, 1992, pp. 14-17.)
 - **Business Incubator.** ... a facility that provides small, entrepreneurial businesses with affordable space, shared support services and business development services, such as financing, marketing and management. (National Business Incubation Association, 1991.)
 - **Technology Incubator.** A business incubator that restricts tenancy to high technology businesses. The technology incubator often includes a technology transfer center or functions as one.
 - **Industrial Park.** An area of land under the control of a single management entity and developed for industrial use by multiple firms.
 - **Technology Park.** An industrial park that restricts tenancy to firms or branches of firms that conduct research and development.
 - **University-Related Technology Transfer Center, Technology Incubator, Technology Park.** The university-related technology transfer center, technology incubator, and technology park have a contractual or operational relationship with one or more universities or other institutions of higher learning and/or scientific research. They promote research and development by the university in partnership with industry by providing a link between university science and industrial research and development
-

The definitions in Chart 1 are intentionally brief and to the point. In application, they become more complex. For example, consider the characteristics of a multi-tenant building, an incubator, and a technology



incubator, which are described in Chart 2. Each one has its own important role to play in supporting the small and medium sized firms that are so important to economic development. The first thing that Chart 2 shows is that an incubator is a type of multi-tenant building, and a technology incubator is a type of incubator. It is a matter of specialization.

Again, all of these definitions are based upon U.S. models and U.S. experience. The definitions describe what is typical, but in practice, each technology incubator or technology park project is unique. Each is defined by its unique goals, organizational structure, financing, and target market. And those factors are shaped by local conditions. You have already begun defining your own model here at GAIG with the opening of this incubator.

GOALS

Goals are the first factor that defines the technology park. Different entities have different reasons for supporting a technology park and therefore they have different goals:

- Government wants to increase the number of jobs in the local economy, to increase its tax revenues and sometimes to find economic use for obsolete buildings.
- A university wants prestige, good jobs for its graduates, research contracts for its faculty, income from licensing new technologies, and sometimes, to find an economic use for property it owns.
- A research institute wants increased prestige, research and development contracts, licensing income.
- Business wants access to new technologies that will help it stay competitive.
- Private developers want a profitable return on their investment.

Because their goals differ, each has a different emphasis and measures success a little bit differently. The combination of entities that support the park shape its goals and thus its character.

Chart 2

Multi-Tenant Building	Incubator	Technology Incubator
Building(s) under single ownership control is developed for use by multiple firms. Tenant firms may be limited to one or more target industries or types of use.	Same as multi-tenant building plus: <ul style="list-style-type: none"> • Tenant firms often are limited to one or more target industries or types of use. • Rents are usually subsidized and lease terms are flexible. • Firms apply for admission and must meet criteria related to the goals of incubator sponsors. • There is a time limit on length of stay; three years is a typical limit. 	Same as incubator plus: <ul style="list-style-type: none"> • Tenant firms must develop or use high technology processes. • Usual location is on or near a research university or research institute campus.
Tenant firms have access to shared services such as receptionist, telephone, security and janitorial, mailing and shipping, the use of copy and FAX machines.	Same as multi-tenant building plus: <ul style="list-style-type: none"> • Tenant firms have access to subsidized management and technical assistance. Tenant firms have access to capital through special loan or venture capital program(s). 	Same as incubator plus: <ul style="list-style-type: none"> • Tenant firms have access to faculty consultants, student employees/interns, technology transfer programs and related research and development activities, employee education and training, as well as sport and other activities at the university.
Tenant firms have access to shared facilities - meeting rooms, bathrooms, break rooms, parking, and sometimes, a cafeteria.	Same as multi-tenant building plus: <ul style="list-style-type: none"> • Tenant firms have access to shared information resources such as a library, data bases, Internet access. 	Same as incubator plus: <ul style="list-style-type: none"> • Tenant firms have access to laboratories and workshops, fiber-optic links into university telecommunications systems with access to research data bases.

MANAGEMENT STRUCTURE

Management structure is the second defining factor for a technology park. The management structure also is shaped by the combination of entities that support the technology parks. In the U.S., technology park organization generally involves a university or research institution. I'll review the U.S. management structures very briefly, because I think the Polish examples are more relevant for you. Possible U.S. management structures include the following:

- **University ownership.** The university develops and operates the park, takes all the risks, and controls the park. Park managers are university employees.



- **Non-profit corporation.** This is a popular structure for technology parks in the U.S. The corporation is governed by a board of directors representing the partners who develop the park.
- **Private development.** An investor develops the park, takes all the financial risk and controls the project. The developer usually has a contractual agreement with a university regarding research services and access to university facilities for park tenants.
- **Government ownership.** This is an option not included in the handout, but there are several city owned technology parks in the U.S., where the city is the investor. Most cities contract with the local chamber of commerce to manage the park.
- **Joint ventures.** Joint ventures are popular and varied. They combine the three management structures described above to allocate risk and responsibilities in the manner agreed upon by the participants. Many are public-private partnerships.

Another organizational decision is whether investors will be allowed to purchase land in the park or whether they will be limited to long-term leases for the use of the land. U.S. parks make greater use of land leases than do parks in other countries. An alternative structure has the park owning both land and buildings, renting space to tenant firms.

The important point of this discussion is the variety and the flexibility of management structures. The management structure is a decision made by the participating entities, and it is designed to fit the unique local situation. A technology park in Poland could be owned and managed by a regional development agency, a foundation, a limited stock company, a consortium of universities, some combination of those. Sponsors select a management structure that meets their needs and is compatible with legal requirements.

FINANCING/CAPITAL NEEDS

Development of a technology park requires capital to implement the project from its initial planning phases to the operation, marketing, and management of the park. It takes time to attract enough investors to start generating revenues that will cover operating expenses, and so sponsors should be prepared to support the park in its early years. Plans for development of a technology park should include plans for meeting these capital needs. Chart 3 lists sources of capital for the investments connected with development of a typical U.S. technology park.

Chart 3

Typical Sources and Uses of Financing for Technology Parks and Incubators

Uses	Sources
Strategic planning; Feasibility, engineering, and architectural studies	University funds; state grants; economic development agencies; private sector funds (through local business contributions)

Infrastructure (roads, utilities, etc.)	University funds; state grants; U.S. Economic Development Administration grants (with match); commercial/bank real estate financing (through developer); taxable bond issues; tax-exempt bond issues
Single-tenant buildings (with lease commitment)	Tenant financing; commercial/bank real estate financing (through developer)
Multi-tenant buildings (speculative)	University funds; state grants; state low-interest loans; commercial/bank real estate financing (through developer)
Multi-tenant buildings (incubator)	State grants; state low-interest loans
Hotel/Conference Center	Commercial/bank real estate financing (through hotel operator/management company)
Amenities (restaurants, day care, other services)	Commercial business financing (through lessee businesses)
Operations; Marketing; Management	University funds; real estate developer; state/local subsidies

Source: Eva Klein & Associates, from *Innovative Models for University Research*, Haden and Brink editors, 1992.

If the technology park includes an incubator, and that is increasingly the case, the incubator usually requires an operating subsidy. In addition, the firms in the incubator have their own capital needs. A technology incubator typically includes programs to help tenant firms access the capital they need to grow their businesses. This too should be included in the project planning. Chart 4 describes the types of capital that are needed by entrepreneurs.



TARGET MARKETS

Marketing is an important part of technology park operation, and the development of the marketing strategy begins in the initial stages of park planning. It starts with an analysis of the local research and development resources to define the technology focus of the park. Because a technology park uses the research resources of sponsoring institutions, the first step is to identify the areas of greatest strength and the areas where there is a demand from industry for research that will lead to innovations in technology.

There are many possible areas of technology on which to focus, and again, each technology park is unique, reflecting the unique local circumstances. A technology park may focus on a single area of technology; for example, the Massachusetts Biotechnology Park. It may encompass numerous industries; for example, North Carolina's Research Triangle Park. The Research Triangle Park includes among its tenants research and development facilities for the pharmaceutical, computer science, and telecommunications industries; air quality laboratories for the U.S. Environmental Protection Agency; and the Research Triangle Institute, which is one of the partners in the Pilot LGPP. These examples are presented to illustrate the diversity that exists in the technology focus of U.S. technology parks.

A second market decision which activities will be allowed in the park. For example, some technology parks allow "clean" manufacturing facilities; others allow only prototype manufacturing. Most allow some office and administrative facilities such as headquarters offices.

Target markets for technology parks are its potential tenants. Decisions about the technology focus and permitted activities shape the marketing strategy by defining the potential tenants. For most technology parks, the target markets include the research and development divisions of large corporations, federal and state government research facilities, university research centers and institutes, industry research institutes, and if there is an incubator, entrepreneurs.

A BRIEF HISTORY: THE EVOLUTION FROM MEGA PARK TO INCUBATOR

The U.S. technology park is a variation of the industrial park, which has long been a popular economic development tool in the United States. The first example, Stanford Research Park, opened for business in Palo Alto, California in 1951. The first tenant in this the first U.S. research park was Varian Corporation, which leased the entire 50 acre set aside for the park. Stanford set aside another 50 acre, and this established the early model of research parks—large tracts of land for large corporate research and development facilities with restrictions upon manufacturing activities within the park boundaries. By 1980, there were 20 research parks in the United States. Most followed the Stanford model.

Chart 4
Capital Needs of Entrepreneurs

Type of Capital: Risk	Definition	Sources	Cost of Capital
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<i>Seed Capital</i> The risk is very high.	The earliest financing, it is used to develop a business or product concept from the idea phase to the prototype phase.	<ul style="list-style-type: none"> Financial resources of the entrepreneur, his/her family and friends Special government programs and public-private partnerships Private investors with a very high tolerance for risk 	Investment terms vary widely: terms for personal loans are negotiated by the individuals involved; government programs are usually grants not loans; and a private investor becomes part owner in the company and receives a share of all profits.
<i>Venture Capital</i> The risk is high.	Financing for small, unproved firms or entrepreneurs, it is used to help develop markets and production capacity for a promising new business or product.	<ul style="list-style-type: none"> Private sector venture capital funds Client firms and/or suppliers (Customers may advance partial payment sufficient to cover purchase of materials; suppliers may extend credit until the product is sold.) Special government programs and public-private partnerships Private investors with a high tolerance for risk 	<p>The venture capitalist investor usually receives stock in the company, is entitled to a share of profits, and may take an active role in management. There may be a time frame for buying back the investor's stock. Interest is rarely assessed, because this is an investment, not a loan.</p> <p>A supplier or customer firm builds the cost of advance payment or extending credit into its contract.</p>
<i>Investment Capital</i> The risk is moderate.	Debt financing to support the growth of firms with a proven record of success, it is used to expand production capacity, move into new markets, and/or add new businesses or products.	<ul style="list-style-type: none"> Banks Capital markets - stocks or bonds Private investors Special contract arrangements with client firms and/or suppliers 	<p>Standard capital sources provide loans or purchase bonds, both of which charge interest, or purchase stock, which conveys ownership rights in the company.</p> <p>As with venture capital, a supplier or customer firm builds this cost into its contract.</p>

The powerful economic impacts and successful operation of the early parks encouraged development of new research or technology parks by government agencies seeking economic expansion and by private developers seeking profits. Most of these new parks selected as their target market, the research and development divisions of large corporations as well as major government laboratories.

By the end of the 1980s, there were over 100 research parks in the United States and others in the planning stage. At the same time, major U.S. corporations entered a period of downsizing, reducing their research and development activities and consolidating their facilities. There were not enough big corporate tenants to fill all the parks. Moreover, the federal government was reducing its research activities.



In response to the market forces, some research parks relaxed restrictions on manufacturing activities within park boundaries—a few had allowed light manufacturing from their beginning. The broader range of allowable uses has encouraged a change to the term “technology parks.” A popular strategy for parks unable to recruit major corporate tenants was to build multi-tenant buildings to serve the market of firms seeking smaller facilities. Parks also began to “grow their own” tenants. They established incubators to encourage entrepreneurial development of technology-based companies.

Today, there are some 150 technology parks in the U.S. This a more diverse group than the early parks were, because parks responded to the more competitive market by stressing their own local advantages and unique character. An incubator has become an important component of the technology park. Most major U.S. research universities participate in a technology park and/or incubator. There are “incubators without walls”—also called virtual incubators. These are programs for providing incubator services to businesses without providing space to rent in an incubator building.

Today, U.S. technology parks have an increasingly international perspective on their role in promoting economic expansion, because they recognize that technology transfer is an international activity. This has been expressed in the increasingly international membership of the technology park associations and the establishment of sister park relationships with parks in other countries. When I talked to people in the U.S., gathering information for this workshop, I found a high level of interest in learning about what you are proposing and a willingness to provide information that could help you.

CONCLUSION

Local characteristics and the sponsoring institutions define each technology park. The following matrix is one format in which such decisions can be considered. It looks at a technology park as an entity with three separate components—the partnership between research and government and business interests, the program of technology transfer, and the real estate—land (and building)—development project. Each cell represents an area for decisions, which will define the technology park project. There are other potential formats. This is presented only as an example, with a few cells filled in to illustrate the types of decisions that need to be made.

Chart 5
Defining the Technology Park

	Partnership	Technology Transfer Program	Land/Building Development
Goals		an office? shared laboratories?	incubator? technology transfer center? land development?

Management Structure	oral agreement? written contract? lead agency?		
Financing Needs & Resources	low:	moderate:	high:
Target Market	university? research institutes? governments? businesses?		

I have not given you a recipe for making a technology park. And you are too knowledgeable about economic issues to think that can be done. I have used the American experience to illustrate the decisions that must be made as you develop your own recipe for a technology park and to describe the information that will help you make strategic decisions.